

**EXHIBIT A  
TO K. BROWN REPORT**

***Kirk W. Brown, Ph.D.***

**Biographical Data**

Principal Consultant; SI Group, LP  
Born: July 3, 1940; Bethlehem, PA  
Citizenship: U.S.A.  
Social Security Number: 171-32-2297  
Marital Status: Married                      No. of Children: 3

**Education**

Ph.D., Agronomy, University of Nebraska, 1969  
M.S., Agronomy/Plant Physiology, Cornell University, 1964  
B.S., Agronomy, Delaware Valley College, 1962

**Areas of Expertise**

Characteristics of Hazardous and Municipal Wastes; Industrial Waste Stream Identification; Classification and Fingerprinting of Waste Materials; Disposal of Municipal, Industrial, and Hazardous Waste by Land Treatment and Landfilling; Land Treatment of Sewage Sludge, Industrial Wastewater and Sludge; Fate and Movement of Salt, Oil, Metals, Organic Chemicals, Gases, Nutrients, Pesticides and Pathogens in Soil and Groundwater Environments; Remediation of Metal and Organic Chemical Contaminated Soils and Groundwater; Leachability and Translocation of Metals in the Soil Profile; Fixation and Stabilization of Metals in the Environment; Bioremediation of Polluted Soils; Vapor Extraction of Soils; Toxicity and Risk-based Assessment of Soil Contaminants to Plants and Animals; Flux of Volatile Chemicals from the Soil Surface; Influence of Chemicals on the Permeability of Landfill Liners; Sources and Transport of Methane; Composting of Municipal and Hazardous Waste; Design and Operation of Septic Systems; Nonpoint Source Pollution; Expansive Properties of Clay Soils; Soil Solution Sampling; Fate of Mutagenic Compounds in Soil; Mold and Fungal Growth; Reclamation of Drastically Disturbed Lands; Aerial Photo Interpretation; Soil Use and Suitability Classification; Agricultural Water Use Efficiency; Crop Water Stress; Golf Green and Athletic Field Construction; Use of Windbreaks; Soil Crusting; Gas Movement in Soil.

***Academic***

Professor Emeritus, Soil and Crop Sciences, Texas A&M University, 2001-Present.  
Professor, Soil and Crop Sciences, Texas A&M University, 1981-2001.  
Associate Professor, Soil and Crop Sciences, Texas A&M University, 1973-1981.  
Assistant Professor, Soil and Crop Sciences, Texas A&M University, 1970-1973.  
Visiting Scientist, Center of Plant Physiological Research, Wageningen, Netherlands, August, 1969-July, 1970.  
Research Assistant, University of Nebraska, June, 1965-December, 1969.  
Teaching Assistant, Cornell University, September, 1964-June, 1965.

**COURSES TAUGHT**

**Soil Physics (Undergraduate Course No. 445) 1970-2001.**

The practical aspects of soil texture, structure, water management, as well as the theoretical aspects of soil water potentials, and the movement of water, ions, gas, and heat in the soil.

**Advanced Soil Physics (Graduate Course No. 617) 1970-1988.**

An in-depth study of the physical properties of soil including basic principles which regulate the dynamics of soil, water and ion movement, soil aeration, and soil thermal relationships. Equations describing these processes are presented and references to current literature are provided for outside reading.

**Reclamation of Drastically Disturbed Lands (Graduate Course No. 615) 1979-1986.**

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Concepts influencing the reclamation, revegetation, and establishment of a stable ecological system on lands that have been drastically disturbed by strip mining, severe erosion, or toxic waste contamination.

**Land Disposal of Wastes (Graduate Course No. 616) 1987-2001.**

The theoretical and practical aspects of the land treatment and landfilling of a wide range of municipal, industrial, and hazardous wastes. Emphasis has been placed on the fate and mobility of various waste constituents in the soil and the influence of soil physical and chemical properties on constituent fate.

*Short Courses Taught*

Soil Science Institute (One month course) 1984, 1986, 1992, 1993  
Land Treatment of Industrial Waste - Chemical Engineering Society, 1982, 1983.  
Landfill Liner Design, University of Texas - 1986, 1987.

**Society Memberships**

American Society of Agronomy, 1970-2001  
Soil Science Society of America, 1970-2001  
American Chemical Society, 1970-2001  
International Society of Soil Science, 1970-2001

**Editorial Board**

Environmental Engineering Science, formerly Hazardous Waste and Hazardous Materials. 1989-2001.

**Reviewed Papers For**

Soil Science Society of America Proceeding; Soil Science, Journal of Environmental Quality; Environmental Engineering Science, formerly Hazardous Waste and Hazardous Materials; ATSDR; American Petroleum Institute; Water, Air & Soil Pollution; Waste Management & Research, Water Pollution Control Federation; Water Research; Waste Management; Journal of Hazardous Materials; Archives of Environmental Contamination and Toxicology.

**Elected Positions**

Chairman, ASA Section A5, 1989-90  
General program chairman for ASA meetings, 1973  
Chairman, ASA Section A3, 1972

**Committee Appointments**

National Academy of Sciences, National Research Council Committee on Environmental Technologies Subcommittee on Landfills (1995-1998).  
EPA Review for Risk Assessment for Petroleum Industry Hazardous Waste Listing Determination (Sept 1995).  
Environmental Geosciences Advisory Committee of the American Geological Institute representing the Soil Science Society of America (1993-2000).  
National Academy of Sciences (NRC) Committee on Remedial Action Priorities for Hazardous Waste Sites (1991-1994).  
Texas Natural Resource Conservation Commission Committee on rules on Wastewater Treatment Plant Sludge, Water Treatment Plant Sludge and Septic Tank Sludge Disposal (1992-1993).  
Texas Water Commission Committee to Develop Regulations on the Land Application of Sewage Sludge (1992-93).  
Faculty of Toxicology Executive Committee, Texas A&M University (1990-93).  
Texas Governor's Infrastructure Committee on Free Trade (1991).  
Oklahoma Corporation Commission on Land Application of Oil Field Drilling Waste (1990-1991).  
Texas Department of Health Ad Hoc Committee for Revising the Construction Standards for On-Site Sewage Facilities (1989-90).  
EPA Hazardous Waste Center Review Panel (1988).  
National Science Foundation, Environmental Engineering Div., Review Panel (1987-1995).  
Texas Dept. of Health Septic Disposal Regulations Revision Panel (1987).

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Advisory Panel to Chicot Aquifer Management Project (Louisiana). McNeese State University, LA (1987-1990).  
 ASA Editorial Committee "Reaction and Movement of Organic Chemicals in Soils" 1987.  
 Advisory Panel to U.S. Congressional Office of Technology Assessment (OTA) on An Assessment of the Effectiveness of the EPA in Identifying, Prioritizing and Cleaning Up Hazardous Waste Sites (1987-1995).  
 Organizing Committee for SSSA Workshop on Utilization, Treatment and Disposal of Waste on Land (1985).  
 Panel to Write Research Needs for Hazardous Wastes Treatment and Disposal for National Science Foundation. Drexel University, PA (1986).  
 EPA Technical Advisory Panel on the Adequacy of Ground Water Monitoring at Hazardous Waste Landfills (1985).  
 Panel to Write the Mutagenicity Sample Preparation Protocol for EPA (1984).  
 EPA Panel to Review the Acceptability of Landfill Disposal of Sewage Sludge (1984).  
 Office of Water Regulations and Standards Committee on Municipal Sludge Landfilling to Advise EPA on the Pollutants which should be Regulated for Various Disposal Options and the Methods or Procedures to be Used for Regulating such Pollutants (1984).  
 Advisory Panel to U.S. Congressional Office of Technology Assessment (OTA) to Determine the Effectiveness of Current Programs to Clean Up Uncontrolled Hazardous Waste Sites (1983-84).  
 EPA Science Review Panel for Environmental Engineering Research Grants (1982-1998).  
 United States Environmental Protection Agency Land Treatment Task Force (1981-1985).

#### **Significant Reports Resulting from Committee Assignments**

National Research Council. 1999. "Groundwater & Soil Cleanup, Improving Management of Persistent Contaminants".  
 National Research Council. 1994. "Ranking Hazardous Waste Sites".  
 Office of Technology Assessment, Congress of the United States of America. 1989. "Coming Clean, Superfund Problems Can be Solved".  
 Office of Technology Assessment, Congress of the United States of America. 1985. "Superfund Strategy".

#### **University Committees**

Texas A&M University Environmental Safety and Health Committee (1987-90).  
 Council of Principal Investigators, Texas A&M University (1986-1990).  
 Texas Agricultural Experiment Station 5-Year Planning Board.  
 Texas A&M University Faculty Forum (1979-82).  
 Texas Agricultural Experiment Station Grant Support Committee (1976-77).

#### **Awards**

Texas A&M University College of Agriculture Award for Excellence in Teaching (1995)  
 Texas A&M University System Award for Excellence in Graduate Teaching (1988)  
 ASA Environmental Quality Research Award (1988)  
 Fellow - Soil Science Society of America (1987)  
 Fellow - American Society of Agronomy (1986)  
 Distinguished Alumni Award, Delaware Valley College (1986)  
 Superior Achievement Award for Research, Soil and Crop Sciences Department, Texas A&M University (1986)  
 Pollution Engineering Magazine Award of Merit for Outstanding Editorial Contribution "The Case for Aboveground Landfills" (1984)

#### **Books Authored**

*Hazardous Waste Land Treatment*. 1983. Butterworth Publishers, 10 Tower Office Park, Woburn, MA 01801.  
*Reactions and Movement of Organic Chemicals in Soils*. 1989. Sawhney, B. L. and K. W. Brown. SSSA/ASA Publishers, SSSA Special Publication No. 22, 494 pgs.

#### **Professional Experience Outside the United States**

Visiting Scientist at Center of Plant Physiological Research, Wageningen (1969-70).

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### **Testimony Before Legislative Bodies**

Texas House of Representatives - Environmental Affairs Committee, April 1987. Testified on the need for legislation to set up a waste management plan for the state.

Texas Governor's Taskforce on Oil Spills, February 1985. Testified on the fate of oil spill debris and disposal technology options.

Texas Governor's Taskforce on Hazardous Waste, November 1984. Testified on the effectiveness of landfills for disposal technology.

Texas Governor's Taskforce on Hazardous Waste, June 1984. Testified on the impact of organic chemicals on the permeability of soils.

U.S. House of Representatives - Science and Technology Committee, November 1982. Testified on the adequacy of EPA's liquid management system to protect groundwater at hazardous waste landfills.

Texas House of Representatives - Environmental Affairs Committee, April, 1982. Testified on the impact of organic chemicals on the permeability of clay liners.

### **Consulting**

Founder and President of K. W. Brown and Assoc., Inc., (1980- 1991). Chief technical consultant to K. W. Brown Environmental Services (1991-1999) and SI Group, LP (2000-Present). Past consulting activities have included assignments with a variety of industries, state, and federal government agencies, including General Motors Corporation, Minnesota Mining & Manufacturing, WR Grace, Union Pacific Railroad, Chevron, Shell, Exxon, Texaco, Arco, Sunoco, El Paso Products, New York Attorney General's Office, Illinois Attorney General's Office, Minnesota Attorney General's Office, Michigan Pollution Control Administration, U.S. EPA, U.S. Army Corps of Engineers, and U.S. Dept. of Justice.

As a consultant, I conducted an extensive survey of industrial and manufacturing facilities, with an emphasis on industrial processes, waste streams generated, and the disposal practices of these facilities. As a result of this expertise I have been able to evaluate or analyze hazardous substances in industrial waste streams from numerous industries including the lumber and paper industries, the printing industry, chemical manufacturing, petroleum processing and refining, plastics and rubber products industry, leather tanning and finishing, metal smelting and finishing, electric utilities, and the electronic components manufacturing industry, among others. I have conducted extensive research on the hazardous substances contained in municipal and household waste with a special emphasis on the fate and mobility of these constituents in the environment after disposal in municipal solid waste landfills.

Consulting activities have included consultations on the cleanup and disposal of wastes, the impacts of hazardous waste on the environment, the design of hazardous waste landfills and solid waste management units, and the fate and mobility of chemicals in the soil, groundwater, and air, as well as, providing expert testimony at permit hearings, mediation hearings, civil suits, and before legislative bodies on these topics. My expertise has been utilized for site assessments, data review and interpretation, the study of fate and transport of contaminants in the environment, waste management activities, historical landfill operations, and other related environmental matters. I have reviewed and interpreted a large quantity of analytical data for air, soils and groundwater, as well as borings logs, field logs, technical reports, and other information related to the environmental conditions of a site. Under the auspices of both state and federal regulatory authorities I have prepared and reviewed remedial action plans for hundreds of sites including contaminated with metals, organic chemicals, pesticides, biological pathogens and petroleum production wastes. Sites for which I have provided evaluations and assessments include: Love Canal Landfill, Lowrey Landfill, Helen Kramer Landfill, Junker Landfill, Lemberger Landfill, Laurel Park Landfill, Beacon Heights Landfill, RCA-Buzby Landfill, Valleycrest Landfill, Lone Pine Landfill, Ft. Bend County Landfill, and Sinton Landfill, among others. In addition, I have also provided expert testimony for civil actions involving the following Superfund sites: Hardage Criner, Montana Pole, National Gypsum, Brio/Dixie Oil Processors, Sikes' Pits, Turtle Bayou, Metal Bank of America, Tar Creek, and the West Dallas Lead Site.

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#### Guest Lectures

- Dewatering of confined dredge spoil areas. In: *Second International Symposium on Dredging Technology*. BHRA Fluid Engineering, Cranfield, Bedford, England. Paper G1:1-24. (1977).
- Revegetation of drastically disturbed lands. Texas A&M Lignite Symposium. April 17-18. (1980).
- Impact of surface mining on water quality. Texas A&M Lignite Symposium, April 17-18, 1980.
- Factors influencing the biodegradation of API separator sludges applied to soils. Presented at the Seventh Annual Research Symposium at Philadelphia, PA. March 16-18, 1981.
- Land treatment of industrial hazardous wastes. Presented at a Symposium and Workshop on Hazardous Waste Management. Louisiana State University, November 16-20, 1981.
- Effect of organic chemicals on clay liner permeability. A review of the literature. Presented at the Sixth Annual Research Symposium at Philadelphia, PA. 1981.
- Land disposal of oily wastes. Brest, France. August, 1982.
- Influence of organic liquids on the permeability of clay soils. Harwell, Great Britain. July, 1982.
- Use of sewage effluent for irrigation. Adelaide, Australia. June, 1982.
- Influence of organic liquids on the integrity of liners to pits, ponds, lagoons and landfills. Waste Water Analysts Assoc., Houston, TX. November, 1982.
- Reclamation of strip mined lands. Sierra Club, Austin, TX. November, 1982.
- Waste disposal on range land. Range Science Department, Texas A&M University. College Station, TX. November, 1982.
- The politics of hazardous waste disposal. Political Science Department, Texas A&M University. College Station, TX. October, 1982.
- The treatment and disposal of hazardous, industrial and toxic waste. American Society of Civil Engineers, Austin, TX. September, 1982.
- Effect of organic fluids on the permeability of clay soil liners. Presented at the Eighth Annual Research Symposium at Ft. Mitchell, Ky. March 8-10, 1982.
- The fate of mutagenic compounds when hazardous wastes are land treated. Presented at the Eighth Annual Research Symposium at Ft. Mitchell, Ky. March 8-10, 1982.
- The influence of chemicals on the permeability of clay liners. Presented at Hazardous Waste Conference, Chicago, Ill. June 28-29, 1983.
- Cleanup of chemicals spilled on soils. Presented at the Texas Agricultural Extension Service Conference, Houston, Texas. June 23, 1983.
- The reclamation of strip mined land. Presented at Texas Environmental Coalition in Austin, Texas Jan. 22, 1983.
- The influence of selected organic liquids on the permeability of clay liners. In: D. W. Shultz (ed). *Land Disposal, Incineration, and Treatment of Hazardous Waste*. Proceedings of the 9th Annual Research Symposium at Ft. Mitchell, Ky. May 2-4, 1983.
- Panel on land treatment of sewage sludge. EPA Workshop on Sewage Disposal, Denver, CO. March 1983.
- Land disposal of hazardous liquids. Waste Management Conference, Houston, TX. February 1983.
- Alternatives to land disposal of waste. Dept. of Agriculture Seminar, University of Houston. Sept. 10, 1984.
- How to write a successful research proposal. Soil Science Graduate Seminar, Soil & Crop Sciences Dept, Texas A&M University, Sept. 19, 1984.
- The advantages of above ground disposal. Waste Tech Conference, Houston, October 30, 1984.
- Potential groundwater implications of surface storage of toxic substances. Groundwater Symposium, Gunter Hotel, San Antonio, Texas. October 30, 1984.
- Clean up of spills; Alternative disposal methods. Geotechnical Engineering for Waste Disposal Symposium, University of Texas, Austin. November 2, 1984.
- The properties of soils and containment of waste. Environmental Engineering Seminar, Civil Engineering Dept., Texas A&M University, College Station, 1984.
- Carbon dioxide flux at the earth's surface. Texas A&M University, College Station, February 1984.
- Above ground landfills in hazardous waste management schemes. National Conference and Exhibition on Hazardous Waste and Environmental Emergencies. Houston, Texas, March 1984.
- Fate of mutagens applied to soil. Environmental Toxicology and Pharmacology Seminar. Texas A&M University, College Station, March, 1984.

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Permeability of compacted soils to solvents mixtures and petroleum products. Presented at the Tenth Annual Research Symposium at Cincinnati, Ohio, April 1984.

Simulation of Potential Rainfall Conservation from Two Cross-Diked Furrow Bed Designs. Texas A&M University, College Station. February 1984.

The soil scientist as a consultant. Soil Science Graduate Seminar, Panel Discussion. Soil & Crop Sciences Dept, Texas A&M University, Sept. 12, 1984.

Land disposal of hazardous waste. Agricultural Engineering Dept. Graduate Seminar, Agricultural Engineering Dept., Texas A&M University. Sept. 13, 1984.

Geotechnical engineering for waste disposal projects. University of Austin, Texas, October 1985.

Monitoring the unsaturated zone. Presented at the National Specialty Conference. Land Treatment: A Hazardous Waste Management Alternative, April 16-18, 1985, Austin, Texas.

Ability of sorbents to retain liquids in landfills, 10th Annual American Organization of Analytical Chemists' Spring Workshop, Dallas, Texas April, 9-11, 1985.

Geotechnical engineering for waste disposal projects. University of Austin, Texas, October 1986.

Potential health effects of hazardous waste contaminants in groundwater. Public Health Grand Rounds, University of Pittsburgh Graduate School of Public Health. January 23, 1986.

Geotechnical engineering for waste disposal projects. University of Texas, Austin, October 1986.

Influence of organic liquids on the hydraulic conductivity of soils. University of Cambridge, United Kingdom. September 9-11, 1987.

Design and construction of the growth media in golf greens, Montreal, Canada, 1987.

Groundwater pollution problems associated with fertilizers, pesticides, and leaking storage tanks. Pro Show, Dallas, November 1987.

Mutagenic testing of hazardous waste sites. Southwest Environmental Mutagenic Society, Houston, November 1987.

The use of lime for waste disposal and treatment of hazardous waste contaminated sites. National Lime Association, Phoenix, AZ, April 1987.

A soil scientist as an expert witness - Presented to the Soil Survey and Land Resource Workshop. February 19, 1988.

Guest lecture to Rio Brazos Audubon Society - May 2, 1988.

Presentation to the Texas Association of Milk, Food and Environmental Sanitarians, June, 1988.

Guest lecture to Range Science Ecology and Land Use class. Dept. of Range Science, Texas A&M University, Nov. 18, 1988.

Hazardous Waste: A general overview. Agricultural Engineering, Environmental and Water Resources Engineering and Texas Water Resources Institute Seminar, Texas A&M University, College Station, TX. January 1989.

The need for community recycling. Environmental Organization, Civil Engineering Dept., Texas A&M University, College Station, TX. February 1989.

Superfund sites: The problems and the solutions. Industrial Hygiene Seminar, Texas A&M University, College Station, TX. February 1989.

Hazardous waste disposal on the Gulf Coast Texas. Texas ASA Annual Meeting. Galveston, Galveston County, Texas, February 1989.

New technologies for liners - Presented at the Conference on Prevention and Treatment of Groundwater and Soil Contamination in Petroleum Exploration and Production. Calgary, Alberta, Canada, May 9-12, 1989.

Guest Lecture to Range Science Ecology and Land Use Class: Dept. of Range Science, Texas A&M University, College Station, TX. Oct. 4, 1989.

Ongoing and future research in the geowaste area. Presented to the Geo Waste Group Meeting, Civil Engineering Dept. Texas A&M University, Nov. 1, 1989.

Waste disposal: where do we go from here? Presented to the MSC Great Issues: Environmental Symposia. Texas A&M University, College Station. Nov. 7, 1989.

Innovative technologies from the 1990s in environmental matters. Presentation to South Texas College of Law Environmental Law Symposium, January 17, 1990.

Waste disposal, past, present, and future. Presented at the seminar entitled "Disposing of Hazardous Materials". MSC, Texas A&M University, College Station, TX January 1990.

Panel discussion session at Vertisol Management Workshop: International Collaboration in Research, Training and Extension. Texas A&M University, College Station, June 25-29, 1990.

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- Municipal waste disposal - where do we go from here. Presentation to Texas Environmental Action Coalition, Texas A&M University, College Station, TX. Sept. 5, 1990.
- Presentation to the Texas Section of American Society of Agricultural Engineers, College Station, TX. October 11, 1990.
- Presentation on golf green construction at Canadian Golf Superintendents Association Conference, Montreal, Canada. Dec. 11, 1990.
- Environmental Soil Science and Technology. Presentation to the 1991 Texas Agric. Experiment Station Conference - Environmental Soil Science Session, College Station, TX. January 1991.
- Movement of pesticides to groundwater. Presentation to the Texas Association of Agricultural Consultants. Austin, Texas, January 21, 1991.
- Movement of pesticides to groundwater. Presentation to the Texas Agricultural Extension Service Conference for Producers, Austin, TX, January 25, 1991.
- Pesticide rinsate disposal options. Presentation to the Research Center Administrators Society meeting, Dallas, Texas February 3-5, 1991.
- Movement of pesticides to groundwater. Presentation to the Texas Agricultural Extension Service Conference for Grounds Keepers. Round Rock, Texas, February 21, 1991.
- Liners for Hazardous Waste Sites. Presented at the Hazardous Waste Management Division's Lecture Series. U.S. Environmental Protection Agency, Region 6, 1445 Ross Ave., Suite 1200, Dallas, TX. 1991.
- Decontamination of polluted soils. Presented at the Second International Conference on the Biogeochemistry of Trace Elements, Taipei, Taiwan, Republic of China. Sept. 5-10, 1993.
- Using plants to reclaim contaminated sites. Crop Science Seminar. Soil & Crop Sciences Dept., Texas A&M University, College Station, TX, October 24, 1994.
- Vadose zone modeling of the fate and movement of volatile contaminants, Geological Society of America, South-central Section Conference, Austin, TX, March 12, 1996.
- Banning of liquid wastes from landfills - development of the technical data and the regulations, South Texas Environmental Conference, Corpus Christi, TX, March 29, 1996.
- The science behind RCRA/CERCLA enforcement (Part II), Science For Environmental Attorneys, Denver CO, November 6, 1997.

#### Scientific Publications

1. Allen, L. H. and K. W. Brown. 1965. Shortwave radiation in a corn crop. *Agron. J.* 57:575-580.
2. Brown, K. W. and W. Covey. 1966. The energy budget evaluation of the micrometeorological transfer processes within a corn field. *Agri. Meteorol.* 3:73-96.
3. Brown, K. W. and L. J. Wright. 1967. Comparison of momentum and energy balance method of computing vertical transfer within a crop. *Agron. J.* 59:427-432. C701.
4. Brown, K. W. and N. J. Rosenberg. 1968. Errors in sampling and infrared analysis of CO<sub>2</sub> in air and their influence in determination of net photosynthetic rate. *Agron. J.* 60:309-311.
5. Brown, K. W. 1969. A model of the photosynthesizing leaf. *Phys. Plant* 22:620-637.
6. Brown, K. W. and N. J. Rosenberg. 1969. Computer program for plotting time dependent meteorological data. *Agric. Meteorol.* 6:463-464.
7. Brown, K. W. and N. J. Rosenberg. 1970. Concentration of CO<sub>2</sub> in the air above a sugar beet field. *Mo. Weather Rev.* 98:75-82.
8. Brown, K. W. and N. J. Rosenberg. 1970. The influence of leaf age, illumination and upper and lower surface differences on stomatal resistance of sugar beet (*Beta vulgaris*) leaves. *Agron. J.* 62:20-24.
9. Brown, K. W. and N. J. Rosenberg. 1970. The effect of windbreaks and soil water potential on stomatal diffusion resistance and photosynthetic rate of sugar beets (*Beta vulgaris*). *Agron. J.* 62: 4-8.
10. Brown, K. W. and N. J. Rosenberg. 1970. Energy and CO<sub>2</sub> balance of an irrigated sugar beet (*Beta vulgaris*) field in the Great Plains. *Agron. J.* 63:207-213.
11. Brown, K. W. and N. J. Rosenberg. 1970. Shading inverted pyranometers and measurements of radiation reflected from an alfalfa crop. *Water Res. Res.* 6:1782-1786.
12. Rosenberg, N. J. and K. W. Brown. 1970. Improvements in the van Bavel-Myer automatic weighing lysimeter. *Water Res. Res.* 6:1227-1229.
13. Briggs, W. W., A. R. Edison, J. D. Eastin, K. W. Brown, J. W. Marenville, and M. D. Clegg. 1971. Photosynthesis light sensor and meter. *Ecology* 52:125-131.

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14. Brown, K. W. and N. J. Rosenberg. 1971. Turbulent transport and energy balance as affected by a windbreak in an irrigated sugar beet (*Beta vulgaris*) field. *Agron. J.* 53:351-355.
15. Brown, K. W. and N. J. Rosenberg. 1971-2. Shelter-effects on micro-climate, growth and water use by irrigated sugar beets in the Great Plains. *Agric. Meteorol.* 9:241-263.
16. Brown, K. W. and N. J. Rosenberg. 1973. A resistance model to predict evapotranspiration and its application to a sugar beet field. *Agron. J.* 65:341-347.
17. Duble, R. L. and K. W. Brown. 1973. Environmental concerns for the golf superintendent. *USGA Green Section Record*. 11:10-13.
18. Brown, K. W. 1974. Calculations of evapotranspiration from crop surface temperature. *Agric. Meteorol.* 14:199-209.
19. Holder, C. B. and K. W. Brown. 1974. Evaluation of simulated seedling emergence through rainfall induced soil crusts. *Soil Sci. Soc. Amer. Proc.* 38:705-710.
20. Brown, K. W., C. J. Gerard, B. W. Hipp and J. T. Ritchie. 1974. A procedure for placing large undisturbed monoliths in lysimeters. *Soil Sci. Soc. Amer. Proc.* 38:981-983.
21. Rosenberg, N.J. and K. W. Brown. 1974. "Self-checking" psychrometer system for gradient and profile determinations near the ground. *Agric. Meteorol.* 13: 215-226.
22. Spotts, J. W. and K. W. Brown. 1975. A technique for installing induction coils in a profile with minimum soil disturbance. *Soil Sci. Soc. Amer. Proc.* 39: 1006-1007.
23. Jordan, W. R., K. W. Brown and J. C. Thomas. 1975. Leaf age as a determinant in stomatal control of water loss from cotton during water stress. *Plant Physiol.* 56:595-599.
24. Brown, K. W. and R. L. Duble. 1975. Physical characteristics of soil mixtures used for golf green construction. *Agron. J.* 67:647-652.
25. Brown, K. W. 1975. A device for isolating soil columns with minimum disturbance. *Soil Sci. Soc. Amer. Proc.* 39:1008-1009.
26. Brown, K. W. and N. J. Rosenberg. 1975. Annual windbreaks boosts yields. *Crop and Soils Magazine*. p. 8-11. Apr-May, 1975.
27. Brown, K. W. 1976. Chapter II. 3. Sugar beet and potatoes. In: *Vegetation and the Atmosphere*. (J. L. Monteith, ed.). Academic Press, NY. p. 65-86.
28. Thomas, J. C., K. W. Brown and W. R. Jordan. 1976. Stomatal response to leaf water potential as affected by preconditioning water stress in the field. *Agron. J.* 68:706-708.
29. Deuel, L. E., Jr., K. W. Brown, F. C. Turner, D. G. Westfall and J. D. Price. 1976. Persistence of Propanil, DCA, and TCAB in soil and water under flooded rice culture. *JEQ* 6:127.
30. Brown, K. W., W. R. Jordan and J. C. Thomas. 1976. Water stress induced alteration in the stomatal response to leaf water potential. *Phys. Plant.* 37:1-5.
31. Chaudhari, K. G., K. W. Brown, and C. B. Holder. 1976. Reduction of crust impedance to emergence by the addition of manure. *Soil Sci.* 122:216-222.
32. Deuel, L. E., Jr., F. C. Turner, K. W. Brown and J. D. Price. 1977. Persistence and factors affecting dissipation of molinate under flooded rice culture. *JEQ* 7:373-377.
33. Brown, K. W. 1977. Chapter 19. Shrinking and swelling of clay, clay strength and other bulk properties of clay soils and clays. In *Minerals in Soil Environments*. (J. B. Dixon and S. B. Weed eds.). Soil Sci. Soc. of Amer., pp. 680-707, Madison, WI.
34. Brown, K. W., R. L. Duble and J. C. Thomas. 1977. Nitrogen losses from golf green, *USGA Green Section Record*. 15:5-7.
35. Brown, K. W., F. C. Turner, J. C. Thomas and M. E. Keener. 1977. Water balance of flooded rice paddies. *J. of Agr. Water Use* 1:277-291.
36. Deuel, L. E. Jr., K. W. Brown, J. D. Price and F. C. Turner. 1977. Persistence of carbofuran and its metabolites, 3-keto and 3-hydroxy carbofuran, under flooded rice culture, *JEQ* 8:23-26.
37. Brown, K. W., R. L. Duble and J. C. Thomas. 1977. Influence of management and season on fate of N applied to golf greens. *Agron. J.* 69:667-671.
38. Brown, K. W. and L. J. Thompson. 1977. Dewatering of Confined Dredge Spoil Areas. Second International Symposium on Dredging Technology. 2-4, November, 1977, Texas A&M University pp. G1-1-G1-24.
39. Shive, J. B. and K. W. Brown. 1978. Quaking and gas exchange in cottonwood (*Populus deltoides*, Marsh) leaves. *Plant Physiol.* 61: 331-333.

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40. Duble, R. L., J. C. Thomas and K. W. Brown. 1978. Arsenic pollution from underdrainage and runoff from golf greens. *Agron. J.* 70:71-74.
41. Duble, R. L., K. W. Brown and J. C. Thomas. 1978. Increase fertilizer efficiency and reduce nutrient loss. *Golf Superintendent* 46:28-31.
42. Jones, S. G., K. W. Brown, L. E. Deuel and K. C. Donnelly. 1978. Influence of rainfall on the retention of sludge heavy metals by the leaves of forage crops. *JEQ* 8:69-72.
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#### Miscellaneous Papers

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**Grant Projects:**

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- "An investigation of the return flow from irrigated land." 1972- 1973. Funded by OWRR for \$31,200. Final Report submitted September, 1974.
- "Fate of metals applied in sewage to land wastewater disposal sites." 1973-1974. Funded by the U. S. Army Medical Corps for \$137,780. Final Report submitted June, 1975.
- "Nutrient and pesticide retention in golf greens built to USGA Green Section specifications." 1972-1975. Funded by the U. S. Golf Association, Green Section for \$21,000. Final Report submitted October, 1975.
- "An investigation of the feasibility of soil disposal of wastewater from Jefferson Chemical Co." 1975. Funded by the Jefferson Chemical Co. for \$16,600. Final Report submitted October, 1975.
- "The influence of Petro S on the infiltration rate and water holding capacity of soil." 1974-1975. Funded by the Petro-chemical Co., Inc. for \$8,280. Final Report submitted December, 1975.
- "The influence of trickle irrigation on the quality of irrigation return flow." 1973-1974. Funded by Office of Water Resources Research for \$45,000. Final Report submitted March, 1976.
- "Analysis of overburden cores TPPI fuel deposit." 1976. Funded by the Texas Power Pool, Inc. for \$24,500. Final Report submitted February, 1977.
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- "Analysis of four overburden cores." 1977. Funded by the Paul Weir Co. for \$5,600. Final Report submitted July, 1977.
- "Accumulation and passage of pollutants in domestic septic tank disposal fields." 1973-1975. Funded by the U. S. Environmental Protection Agency for \$294,864. Final Report submitted December, 1977.
- "Development of management guidelines to prevent pollution by irrigation return flow from rice fields." 1972-1975. Funded by U. S. Environmental Protection Agency for \$197,850. Final Report published April, 1978.
- "Physiological model of plant growth and development of ecosystem simulation." 1975-1978. Funded by the National Science Foundation for \$129,813. Final Report submitted June, 1978.
- "Evaluate the feasibility of revegetating mixed overburden at the proposed Angelina County lignite site." 1977-1978. Funded by the Sunoco Energy Development Company for \$46,031. Final Report submitted June, 1979.
- "Characteristics of overburden material and revegetation analysis for the Southwest Electric Power Company Deposit." 1977- 1978. Funded by the Southwest Electric Power Company for \$53,600. Final Report submitted July, 1979.
- "The impact of surface lignite mining on surface and groundwater quality." 1978-1979. Funded by the Texas Energy Advisory Council for \$61,022. Final Report submitted September, 1979.
- "Analysis of groundwater quality and the probable quality of leachate, TMPA Fuel Deposit, Grimes County, Texas." 1977. Funded by the Municipal Power Agency for \$20,205. Final Report submitted November, 1979.
- "To investigate the feasibility of irrigation disposal of uranium stripping reclamation water." 1979. Funded by nine private companies for \$9,869. Final Report submitted December, 1979.
- "Statistical and biophysical modeling of Dendroctonus frontalis-Host tree dynamics: II. Physical models of Dendroctonus frontalis - Host tree systems." 1975-1979. Funded by the USFS-CSRS Expanded Southern Pine Beetle Program for \$174,780. Final Report submitted December, 1979."
- "Investigate the concentration of heavy metals and other parameters in lignite overburden cores from Grimes County." 1978. Funded by Texas Municipal Power Agency for \$7,192. Final Report submitted.
- "To investigate the feasibility of irrigation disposal of uranium stripping leach water. Phase II: Laboratory Study." 1979. Funded by Mobil Oil Corp. for \$20,000. Final Report submitted January, 1980.
- "To investigate the necessity of a sand layer between the top mixture and gravel layer in golf green construction." 1978-1979. Funded by the United States Golf Association, Greens Section for \$3,220. Final Report submitted March, 1980.

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- "To develop a plan to minimize the volume of runoff water which must be treated and disposed of and to assess the feasibility of land disposal of the runoff water and sludge." 1979-1980. Funded by Texas Engineering Extension Service for \$11,058.40. Final Report submitted April, 1980.
- "Investigate the concentration of heavy metals and certain other physical and chemical properties - Gibbons Creek Lignite Mine." 1980. Funded by Texas Municipal Power Agency for \$12,500. Final Report submitted April, 1980.
- "Improved water and nutrient management through high-frequency irrigation." 1977-1980. Funded by Texas Water Resources Institute for \$179,435. Work completed June, 1980.
- "Environmental and safety aspects of the use of sulfur in highway pavements." 1980. Funded by the DOT-Federal Highway Administration for \$38,951. Final Report submitted August, 1980.
- "Root distribution of bermudagrass grown on reclaimed lignite spoil." 1980-1981. Funded by the Center for Energy and Mineral Research for \$12,590. Final Report submitted August, 1981.
- "A residual evaluation of the influence of chemicals on the permeability of soil clays." 1979-1980. Funded by the Environmental Protection Agency for \$91,783. Report submitted December, 1981.
- "Investigate the influence of organic matter quality and placement on the establishment of grass and the physical properties of golf green mixes." 1979-1981. Funded by the U. S. Golf Association, Green Section for \$10,177. Final Report submitted February, 1982.
- "Metal uptake by grasses grown on reclaimed lignite spoils." 1979-1980. Funded by the Center for Energy and Mineral Research for \$13,100.
- "Soil disposal of API pit wastes." 1977-1980. Funded by the Environmental Protection Agency for \$184,104. Final report submitted in 1981.
- "Evaluate subsurface landfarm contamination after long term use." 1980-1981. Funded by the American Petroleum Institute for \$98,530. Final Report published in 1983.
- "The use of bioassays to evaluate the environmental impact of land treatment of hazardous industrial wastes." 1980-1983. Funded by the Environmental Protection Agency for \$383,732. Final Report published in 1985.
- "A review and evaluation of the influence of chemicals on the permeability of soil clays." 1981. Funded by the Environmental Protection Agency for \$339,056. Final report published in 1983.
- "Quantify leak rates through holes in landfill liners" 1983-1985. Funded by Environmental Protection Agency for \$232,769. Final report submitted in 1986.
- "Efficiency of soil core and soil-pore liquid sampling systems". 1983-1985. Funded by Environmental Protection Agency for \$101,766. Final report submitted in 1986.
- "Completion of Field Investigation and an Evaluation of Mechanisms by which Organic Liquids Alter the Permeability of Clay Soils". 1984-1985. Funded by EPA for \$59,000. Final report submitted in 1986.
- "Mobility and Stability of Mutagenic Compounds in Municipal Sewage Sludge Amended Soil." 1984-1986. Funded by Environmental Protection Agency. for \$281,800.
- "Development of a Capillary Wick Unsaturated Zone Pore Water Sampler." 1985-1986. Funded by Environmental Protection Agency for \$236,353.
- "Evaluation of the Thickness of Clay Liners Required to Meet RCRA Requirements". Funded by Environmental Protection Agency. 1987-1989. First year funding \$122,184.
- "Development of a Pesticide Rinse Water Digester". 1986-88. Funded by Texas Water Resource Institute for \$58,000.
- "Determination of the optimum furrow dike size to minimize rainfall runoff". 1985. Funded by Texas Water Resource Institute for \$17,500.
- "In situ vapor extraction of volatile contaminants at Superfund sites" 1987-88. Funded by Texas Water Resource Institute for \$40,000.
- "Development of a comprehensive testing protocol to assess the hazard of an uncontrolled hazardous waste site". 1987-89. Funded by Environmental Protection Agency for \$315,897.
- "Evaluation of the Bacterial Mutagenicity and Chemical Characteristics of Municipal Landfill Leachate". 1988-1990. Sponsored by Texas Water Resource Institute, \$47,500.
- "Bioassay Directed Chemical Characterization of Hazardous Organic Chemicals in Waste Contaminated Environments". Funded by National Institute of Health, 1989-1992, \$422,000.
- "The Use of Short-Term Bioassays to Assess the Human Health Hazard of Uncontrolled Hazardous Waste Sites". Funded by National Institute of Health, 1989-1992, \$607,000.
- "In Situ Bioremediation of Hazardous Substances in the Vadose Zone". Funded by USEPA, 1988-1991, \$341,164.

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"Effectiveness of Multiple Liner Systems for Hazardous Waste Containment Facilities". Funded by USEPA, 1988-1991, \$387,203.

"The Use of In-Vessel Composting as a Treatment Technology for Hazardous Waste Minimization". Funded by Gulf Coast Hazardous Substance Research Center, June 1, 1991-April 30, 1994, \$107,471.

"Site Assessment." Funded by NIH for \$334,650 for first 3 years. 1992-1996.

"Demonstration of the Degradation of Toxic Organics in Composted Municipal Solid Waste." Funded by Texas Water Commission for \$135,000 for two years, 1992-1994.

"A Preliminary Demonstration of the Use of In-Vessel Composting for Degradation of Waste Propellants." Sponsored by Day & Zimmermann, Inc. 1993. Funds amounted to \$18,138.

"Water Use Efficiency and Wetting Patterns Associated with Directed Subsurface Irrigation." Sponsored by Texas-Israel Exchange Program through the Texas Department of agriculture 1995-1996 Funds amount to \$27,770.

**EXHIBIT B  
TO K. BROWN REPORT**

## COMPREHENSIVE LISTING OF TESTIMONY BY K. W. BROWN

TRIAL TESTIMONY	DATE
20 Case no. 04-C-296-2; <i>Lenora Perrine, et al., Plaintiffs vs. E.I. DuPont de Nemours and Company, et al., Defendants</i> , in the Circuit Court of Harrison County, West Virginia. This case involved the contamination of homes and properties with metal dust from the former Meadowbrook Smelter in Spelter, West Virginia. Retained by the Plaintiffs.	5/1/06
19 Civil Action No. 95-CV-6400L, <i>Seneca Meadows, Plaintiff vs. ECI Liquidating, et al., Defendants</i> in the United States District Court, Western District of New York. This case involved claims against defendants concerning the disposal of hazardous substances in the Tantalo Landfill, Seneca Falls, New York. Retained by the Plaintiff.	6/21/05 to 6/23/05
18 Civil Action No. 01:01-CV-890; <i>Lyondell Chemical Company, et al., Plaintiffs v. Albemarle Corporation, et al., Defendants</i> in the United States District Court for the Eastern District Of Texas, Beaumont Division. This case involved the disposal of waste containing hazardous substances and groundwater contamination at the Turtle Bayou Superfund in Liberty County, Texas. Retained by ExxonMobil, Defendant.	4/18/05
17 Cause No. 03-001121-CV; <i>Joseph Paul Horlen, et al., Plaintiffs, v. Robert S. Smith and Robo Investments, Inc., Defendants</i> in the District Court of Brazos County, Texas, 361 <sup>st</sup> Judicial District. Case involved the subsurface loss of water from a man-made lake within a residential subdivision and the subsequent undercutting of riverbank along the Brazos River. Retained by the Plaintiffs.	6/17/04
16 Civil Action No. 98-CV-0838S (F); <i>W.R. Grace &amp; Co.-Conn., Plaintiff, V. Zotos International, Inc., Defendant</i> in the United States District Court Western District Of New York. Case involved the disposal of cosmetic waste at the Brewer Road Landfill in Waterloo County, and the contamination of groundwater as a result of these disposal practices. Retained by the Plaintiff.	5/17/04 to 5/21/04
15 Civil Action No. 95-2097 <i>Interfaith Community Organization, et al., Plaintiffs v. Honeywell International, Inc. et al., Defendants</i> . In the United States District Court for the District of New Jersey. This case involved claims against the defendants concerning disposal of chromium waste at the Roosevelt Drive-In Site in Jersey City, New Jersey. Retained by W.R. Grace & Co., W.R. Grace Ltd. and ECARG, Inc., Plaintiffs.	1/28/03 to 1/29/03
14 Case No. 80-1589; <i>United States of America, Plaintiff, vs. City of Philadelphia, Plaintiff-Intervenor, vs. Union Corporation Metal Bank of America, et al., Defendants, vs. Consolidated Edison Company of New York, et al., Third Party Defendants</i> . In the United States District Court for the Eastern District of Pennsylvania. This case involved claims against the defendants concerning the release of PCBs from the Metal Bank/Cottman Avenue Site to the Delaware River. Retained by the Defendants	08/29/02 to 09/05/02